

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) PROCESS FOR THE BURNING-IN OF LAYERS ON PRINTING PLATES

(71) We, KALLE AKTIENGESELLSCHAFT, a body corporate organised according to the laws of Germany, of 190-196 Rheingastrasse, Wiesbaden-Biebrich, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention is concerned with a process for the burning-in of layers on printing plates.

It is known to subject light-sensitive presensitized offset printing plates, after image-wise exposure, development and correction, to a short heat-treatment, either by passing a flame over them, preferably from the back, by treating them with a hot flat-iron, or by conducting them over heated rollers. By this treatment, the areas forming the printing image, i.e. the parts of the diazo layer retained on the support, are "burned-in", i.e. altered in two respects: To begin with, the image areas on the base are mechanically hardened by after-heating, so that they are less easily damaged by light action, e.g. during storage and printing, and yield considerably longer runs. Further, the image areas become chemically more resistant as the result of an intensive heat-treatment, so that they are less susceptible to attack by printing inks containing large proportions of solvent or by etching agents, than are the areas of a layer which has not been burned in. In the case, for example, of positive-working offset printing plates, these changes become visible by a change of colour of the originally yellow-green diazo layer to pink during a first phase of the burning-in process, and then to brown during a second phase.

The above mentioned heating methods are disadvantageous, however, in that they do not guarantee a satisfactory reproducibility of the temperature generated in the printing plate and may even

damage the plate, and a uniform burning-in of all image-areas of the plate is not possible.

Attempts have been made to eliminate these drawbacks by heating the printing plate in a heating cupboard instead of in the manner described above.

In this way, a temperature can be adjusted which is much more easily reproducible. The uniformity of burning-in is also markedly improved, although it is not completely satisfactory. In order to avoid mechanical damage to the plate, however, great care must be taken when inserting the plate into the heating cupboard. Further, because of the predominantly convective heat transfer, long heating-up periods must be taken into account until such a cupboard has reached the desired temperature and the printing plate has also assumed this temperature. These disadvantages become the more aggravating the larger the size of the printing plate which is to be subjected to a heat-treatment. It is much more difficult to provide an overall uniform temperature in large heating cupboards than it is in smaller ones and, further, large heating cupboards are expensive and their operation is costly, because the heating-up time increases with the size of the cupboard.

The present invention provides a process for burning-in an exposed and developed layer of a sensitized printing plate, wherein the layer is heated by means of electromagnetic radiation directed towards the said layer from a radiation source having a radiation area less than the layer surface area there being relative movement between the plate and the source so that the entire surface of the layer is irradiated. A more uniform, more rapid, and more economic performance of the thermal treatment of printing plates than was hitherto possible is thereby achieved.

In principle, the process of the invention can be applied to any desired type of printing plate, provided that the minimum

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temperature at which burning-in of the layer produces the desired effect and the maximum temperature to which the base material may be exposed can be satisfactorily reconciled. Preferably the layer is heated by infra-red radiation having a proportion of 10 to 15 per cent of the radiation within the visible range of the spectrum. When the layer is a light-sensitive diazo layer, the minimum temperature required for burning-in has been found to be about 180°C. In the case of polyester base films, temperatures in the range 180 to 200°C are only just permissible, whereas aluminium supports can be heated to about 250°C without showing any detrimental recrystallization phenomena. Other metallic supports, e.g. brass or steel, withstand even higher temperatures.

In order to maintain the thermal stress upon the base as low as possible, burning-in of the layer is preferably performed by causing the electromagnetic radiation to act upon the layer side and not on the back of the printing plate. If necessary, the back of the plate may be in contact with a cooled support. The irradiated energy is utilized much better, however, when heat conduction from the back of the printing plate is avoided, either by fastening the plate in a suitable clamp and suspending it freely in the air, or by placing it upon a support with thermal insulation, e.g. by inserting a layer of asbestos between the back of the plate and the surface of the support, or by maintaining an air gap between the plate and the support, or by other suitable means.

In order to avoid local over-heating and to distribute the electro-magnetic radiation as evenly as possible, there is relative movement between the printing plate and the source of radiation, preferably while maintaining a constant distance between them. This may be achieved by fastening the printing plate to the surface of a cylinder which rotates constantly past the source of radiation. Instead, the printing plate may be mounted on a carriage and moved in one plane to and fro in front of the source of radiation, or the source of radiation may be moved in front of the printing plate. As a particular embodiment, the process of the invention may be performed continuously, by causing several printing plates to pass in close succession through a zone heated by several radiation sources.

In order to cause all image areas of a printing plate to be burned-in as uniformly as possible and to attain the highest possible thermal effect, it has proved to be of advantage to have the electro-magnetic radiation act simultaneously over the entire width of the printing plate. Thus, a tubular source of radiation is preferred, which is arranged transversely to the direction of the

relative motion between the printing plate and the source of radiation, with its radiation focused upon a straight line extending over the whole width of the layer on the printing plate.

An even better utilization of the irradiated energy may be achieved by dyeing the layer to be burned-in and thus increasing its absorption capacity for the radiation. In many cases, this involves no additional work, because, to facilitate correction after development, most printing plates are provided with a coloured layer, which improves the contrast between image areas and background.

As already mentioned, it is a prerequisite for the satisfactory functioning of the process of the invention that the layer to be burned-in is heated to a temperature which is high enough, whereas the base material must not be heated beyond a certain limit which is specific to the material used. To avoid destruction of a printing plate by the after-heating process, the temperature of the base is advantageously established by controlling the relative motion between the printing plate and the source of radiation, and, if necessary, by additionally varying the distance between the printing plate and the source of radiation, the maximum values adjusted being of course adapted to the particular combination of layer and base used. In a further embodiment of the present process, this temperature control is effected automatically, preferably by impulses given by a temperature measuring device in contact with the back of the base material. Besides the customary supporting and conveying means, an apparatus suitable for performing the process of the invention contains, as heating element, a source of electro-magnetic radiation, preferably a quartz-halogen lamp. In a preferred embodiment of the apparatus, this source of radiation is in the form of a tube and is equipped with an elliptical radiation reflector which produces an optimum focusing of the radiation upon the layer to be burned in.

The sources of electro-magnetic radiation proposed are distinguished by a heating-up period which is considerably shorter than that of heating cupboards. This holds true particularly for quartz-halogen lamps, which reach their colour and operational temperature about one second after being switched on. With good reflection and focusing, about 65 per cent of the radiation emitted by such a lamp can be beamed upon the surface to be heated. When the layer possesses a high intrinsic absorptive capacity for the wave length emitted, the irradiated energy is used almost completely for heating. If this should not be the case, it may be of advantage to colour the

layer to be burned in with a suitable dyestuff. But even if the geometrical and absorptive conditions are not particularly good, the process of the invention brings about considerably savings in energy and time, as compared with customary after-heating processes. Surprisingly, no negative effects are caused by heating the layer in a manner which could be termed "thermal shock". The partial pyrolytic decomposition of the frequently resin-containing layer composition — which inevitably occurs during heating to the burning-in temperature, but, surprisingly, when due care is taken, has no detrimental effect upon the layer in the hitherto used, relatively expansive burning-in processes — is not increased by the process of the invention, despite the steep temperature increase, so that the quality of the printing plate is not reduced.

The quartz-halogen lamp preferably used in the process of the invention has essential advantages over other known electromagnetic sources of radiation, such as known infra-red heating rods: its heating-up period is 2 seconds at the most, as compared with at least 30 seconds in the case of such heating rods, which facilitates a faster and more economic operation; further, owing to the smaller dimensions of the light source, it enables a better focusing, i.e. more exact beaming of the irradiated energy on the layer (an advantage which is particularly evident when thicker bases are used); and, finally, it has a considerably higher proportion, which may be 10 to 15 per cent, of radiation within the visible range of the spectrum, whereby the hardening effect of the heat-treatment is significantly increased, particularly in the case of positive-working offset printing plates, because the light-sensitivity of the image areas, which reduces their mechanical strength, is lost by irradiation with visible light.

Nevertheless, in specific cases, other sources of electro-magnetic radiation may be used instead for the after-heating of printing plates. A desired method of such thermal treatment can easily be adapted to the requirements of a particular case as far as duration, intensity, and effectiveness of the treatment and the most suitable means to be selected are concerned.

The invention is illustrated by way of example in the accompanying drawing, the single figure of which is a perspective view of an apparatus for carrying out the process of the invention.

Referring to the drawing, 1 is a plate or frame to which a printing plate 2 is fastened, 3 is a source of radiation, 4 is the lead-in

cable of the source of radiation and 5 is a reflector.

WHAT WE CLAIM IS:—

1. A process for burning-in an exposed and developed layer of a sensitized printing plate, wherein the layer is heated by means of electro-magnetic radiation, directed towards the said layer from a radiation source having a radiation area less than the layer surface area, there being relative movement between the plate and the source so that the entire surface of the layer is irradiated.

2. A process as claimed in claim 1, wherein the layer is heated by infra-red radiation having a proportion of 10 to 15 per cent of the radiation within the visible range of the spectrum.

3. A process as claimed in claim 1 or 2, wherein a light-sensitive diazo layer disposed on a metallic base is heated to a temperature of at least 180°C.

4. A process as claimed in any one of claims 1 to 3, wherein the radiation is focused on a straight line extending transversely to the direction of relative movement between printing plate and source of radiation and caused to act simultaneously and uniformly over the entire width of the layer side of the printing plate.

5. A process as claimed in any one of claims 1 to 4, wherein the back of the printing plate is thermally insulated.

6. A process as claimed in any one of claims 1 to 5, wherein the layer contains a dye for increasing the absorption capacity of the layer for the radiation used.

7. A process as claimed in any one of claims 1 to 6, wherein the temperature of the base is established by controlling the relative motion between the printing plate and the source of radiation, and, if necessary by additionally varying the distance between the printing plate and the source of radiation.

8. A process as claimed in any one of claims 1 to 7, wherein the establishment of the temperature of the base is effected automatically.

9. A process as claimed in claim 1, substantially as described herein.

10. A process as claimed in claim 1 carried out substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

ABEL & IMRAY,
Chartered Patent Agents,
Northumberland House,
303-306 High Holborn,
London, WC1V 7LH.

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COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of
the Original on a reduced scale*

